



MasterDrain
SW

Muir Associates (UK) Limited

www.muir-associates.co.uk

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Job No. 1132-22		
Sheet no. 1		
Date 21/11/22		
By MJ	Checked	Reviewed

Project

Title **Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW CCF = 40%**

Using in-line restrictors
Return period = 100 yrs
Climate change factor = 40

PEAK hydrograph values printed
Storm duration = 30 mins
No offline storage

Mean rain intens. 86.00 mm/hr
Storm profile = Summer
Using FSR data

Peak rain intens. 337.12 mm/hr
Sample period = 15.0 secs.

Entry No.	SECT. No.	MANHOLE REF	PIPE CAPACITY l/s	RATE FLOW l/s	PIPE SIZE mm	CHAMBER DIAM/LxW mm	INVERT LEVEL m	WATER LEVEL m	GRND LEVEL m	SURCHARGE fract.	Depth	EXCESS FLOW l/s	FLOODED VOL m³	DRAINED AREA (m²) x FACTOR	STATUS
1	I	1.01 S-MH-01	42.1	21.4	225	1200	43.85	43.97	44.80	0.51	0.11	0.00	0.000	527	OK
2	I	1.02 S-MH-02	77.8	63.9	300	1200	43.58	43.81	44.80	0.82	0.23	0.00	0.000	1579	OK
3	I	1.03 S-MH-03	78.4	85.3	300	1200	43.43	43.82	44.80	1.09	0.39	6.89	0.000	2106	Surch.
4	I	1.04 S-MH-04	78.0	85.3	300	1500	43.30	43.66	44.60	1.09	0.36	7.28	0.000	2106	Surch.
5	B	2.01 S-MH-09	184.0	43.1	450	1500	43.08	43.21	44.35	0.23	0.13	0.00	0.000	1065	OK
6	B	2.02 S-MH-10	184.9	144.2	450	1500	42.99	43.32	44.35	0.78	0.33	0.00	0.000	3560	OK
7	B	2.03 S-MH-12	398.2	144.2	450	1500	42.87	43.04	44.35	0.36	0.18	0.00	0.000	3560	OK
8	I	1.05 S-MH-05	227.8	229.4	450	1500	42.79	43.26	44.42	1.01	0.46	1.67	0.000	5666	Surch.
9	B	3.01 S-MH-13	42.1	21.4	225	1200	43.90	44.01	44.80	0.51	0.11	0.00	0.000	527	OK
10	B	3.02 S-MH-14	95.8	64.1	300	1200	43.70	43.89	44.80	0.67	0.19	0.00	0.000	1582	OK
11	B	3.03 S-MH-15	298.4	85.4	300	1200	43.47	43.57	44.92	0.29	0.10	0.00	0.000	2109	OK
12	I	1.06 S-MH-06‡	14.6	4.8	150	1500	42.72	42.77	44.75	0.33	0.05	0.00	0.000	7775	OK
13	I	1.07 S-MH-07	14.6	0.0	150	1200	42.65	42.66	44.35	0.00	0.00	0.00	0.000	0	OK
14	I	1.08 S-MH-08	18.6	0.0	150	1200	42.40	42.40	44.46	0.00	0.00	0.00	0.000	0	OK



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Notes

Printout headings

- | | | |
|---|---|--|
| 1) Entry no - position in file | 2) Section no - pipe identifier | 3) Manhole ref - Manhole identifier |
| 4) Pipe cap - full bore capacity of that pipe | 5) Rate of flow - calculated flow rate (l/s) ‡ = flow restrictor. | 6) Pipe diam - outlet pipe diameter (mm) |
| 7) Chamber diam - chamber diam. at base of MH | 8) Invert level - invert level of manhole | 9) Water level - calculated peak water level. |
| 10) Grnd level - ground / cover level | 11) Surch. fract - calc.flow/pipe capacity | 12) Surch. depth - surcharge level above soffit |
| 13) Overflow - surcharged flow rate (l/s) | 14) Flooded vol - volume of water above cover | 15) Upstrm Vol - upstream pipe vol to previous manhole(s) |
| 16) Status - OK - outlet not surcharged | 17) Status - Surcharged - outlet surcharged | 18) Status - Warning - water level within 299mm of cover level |
| 19) Status - Flooded - cover over-topped | 20) § against diameter indicates throttle pipe used. | |

Title box

Hydrograph data

- | | | |
|---|--------------------------------------|--|
| 1) Ret. period - that used to calculate profile | 2) Duration - length of storm (mins) | 3) Profile - either Winter (75%) or Summer (50%) |
|---|--------------------------------------|--|

Flow restrictors

Manhole reference - S-MH-06

Restrictor flowrate - 4.83 l/s

Flood volumes

Check that the upstream storage of the manhole is adequate to take the flood volume - see Upstrm Vol above.



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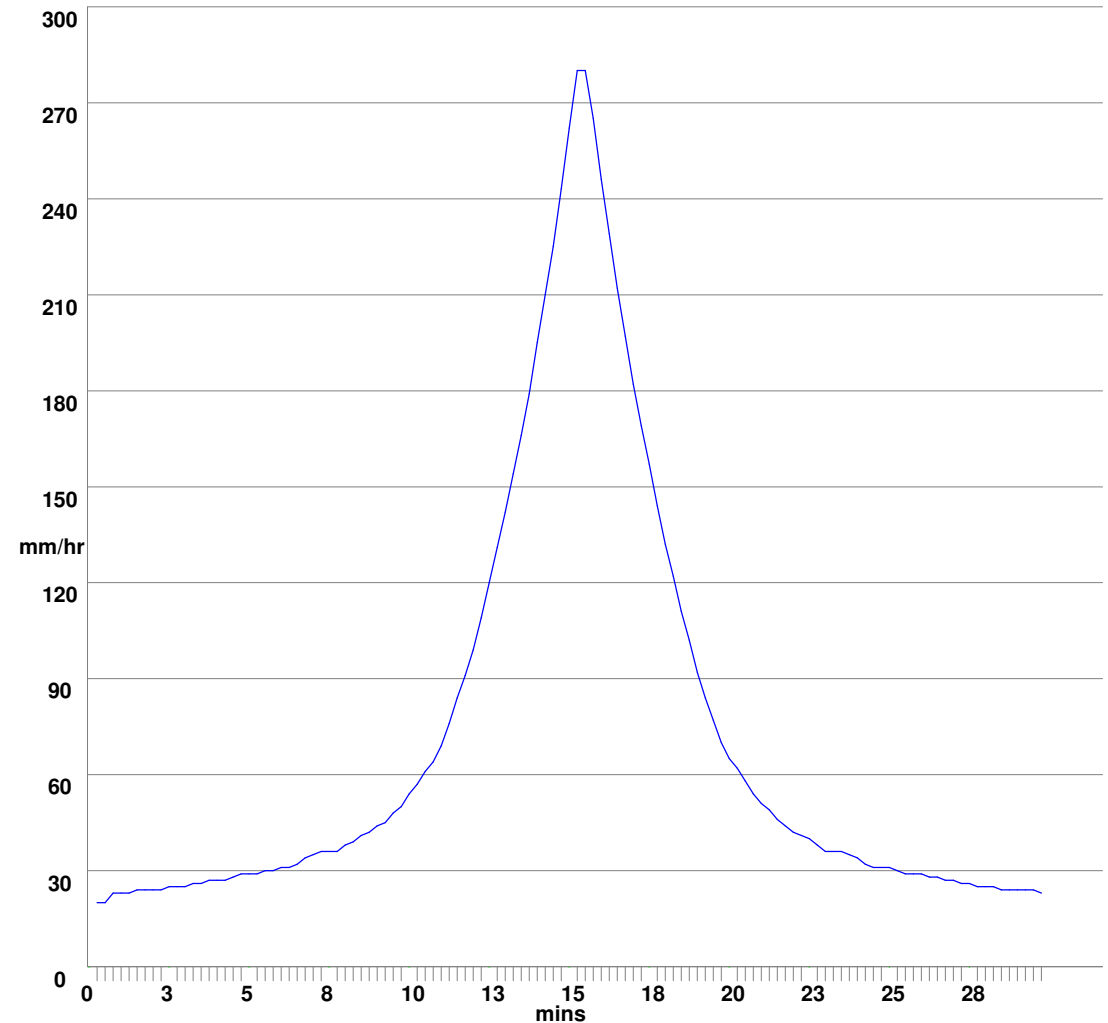
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Time mins	Rain mm/hr	Time mins	Rain mm/hr	Time mins	Rain mm/hr
0:15	20.03	10:15	57.22	20:15	61.51
0:30	20.03	10:30	60.79	20:30	57.93
0:45	22.89	10:45	64.37	20:45	54.36
1:00	22.89	11:00	69.38	21:00	50.78
1:15	22.89	11:15	75.81	21:15	48.63
1:30	23.60	11:30	83.68	21:30	45.77
1:45	23.60	11:45	90.83	21:45	43.63
2:00	24.32	12:00	98.70	22:00	42.20
2:15	24.32	12:15	109.43	22:15	40.77
2:30	25.03	12:30	120.16	22:30	40.05
2:45	25.03	12:45	130.88	22:45	37.91
3:00	25.03	13:00	142.33	23:00	36.48
3:15	25.75	13:15	154.49	23:15	36.48
3:30	25.75	13:30	165.93	23:30	35.76
3:45	27.18	13:45	178.80	23:45	35.05
4:00	27.18	14:00	194.54	24:00	34.33
4:15	27.18	14:15	209.56	24:15	32.18
4:30	27.89	14:30	225.29	24:30	31.47
4:45	28.61	14:45	243.17	24:45	30.75
5:00	29.32	15:00	261.77	25:00	30.75
5:15	29.32	15:15	280.36	25:15	30.04
5:30	30.04	15:30	280.36	25:30	29.32
5:45	30.04	15:45	265.34	25:45	29.32
6:00	30.75	16:00	246.03	26:00	28.61
6:15	31.47	16:15	228.87	26:15	27.89
6:30	32.18	16:30	212.42	26:30	27.89
6:45	33.61	16:45	196.68	26:45	27.18
7:00	35.05	17:00	182.38	27:00	27.18
7:15	35.76	17:15	168.79	27:15	25.75
7:30	36.48	17:30	156.63	27:30	25.75
7:45	36.48	17:45	144.47	27:45	25.03
8:00	37.91	18:00	132.31	28:00	25.03
8:15	38.62	18:15	122.30	28:15	25.03
8:30	40.77	18:30	110.86	28:30	24.32
8:45	42.20	18:45	101.56	28:45	24.32
9:00	43.63	19:00	92.26	29:00	23.60
9:15	45.06	19:15	84.39	29:15	23.60
9:30	47.92	19:30	77.24	29:30	23.60
9:45	50.06	19:45	70.09	29:45	22.89
10:00	53.64	20:00	65.08	30:00	22.89

Hydrograph profile derived from data in the Flood Studies Report

Return period= 100 yrs Duration= 30 mins Profile - summer





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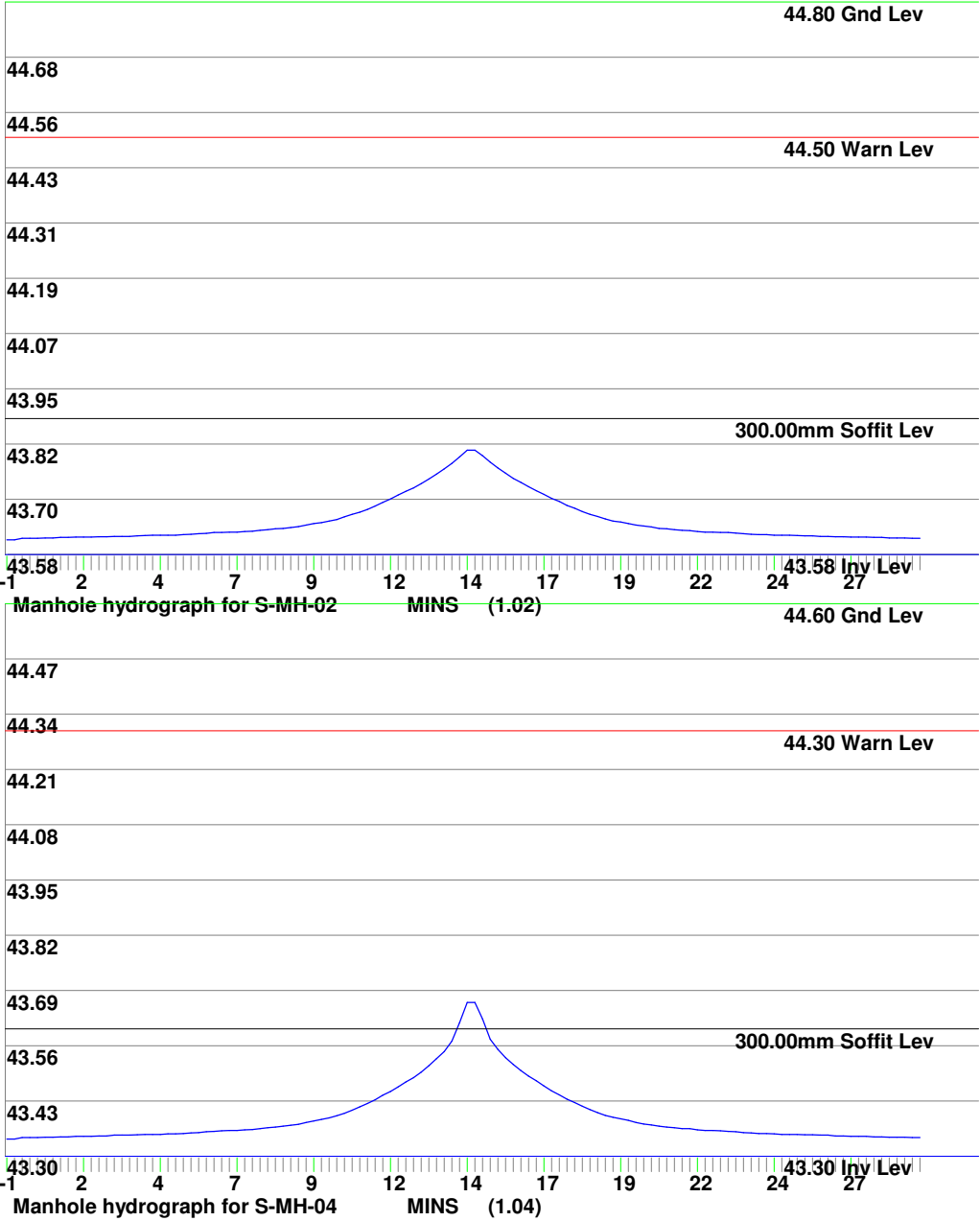
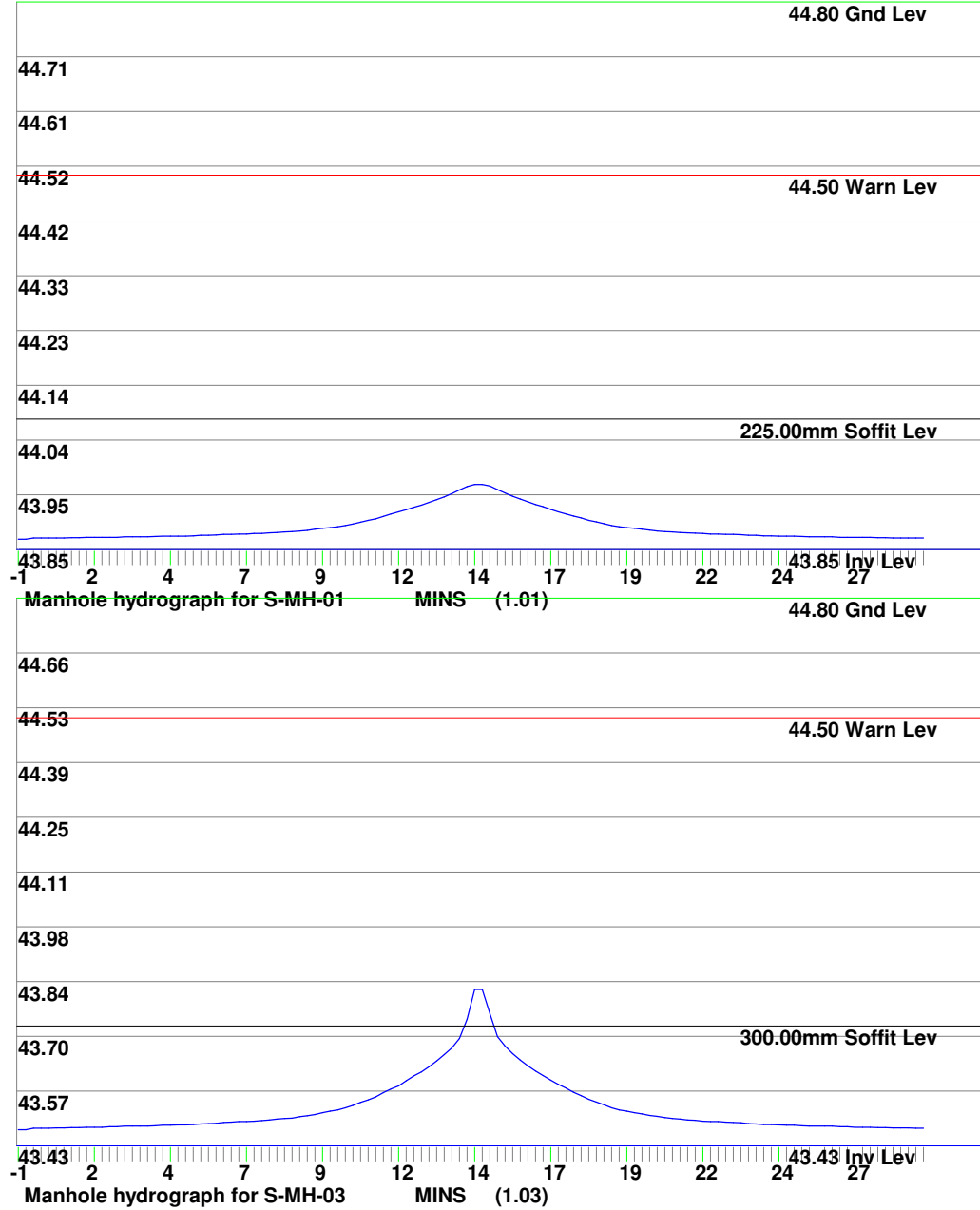
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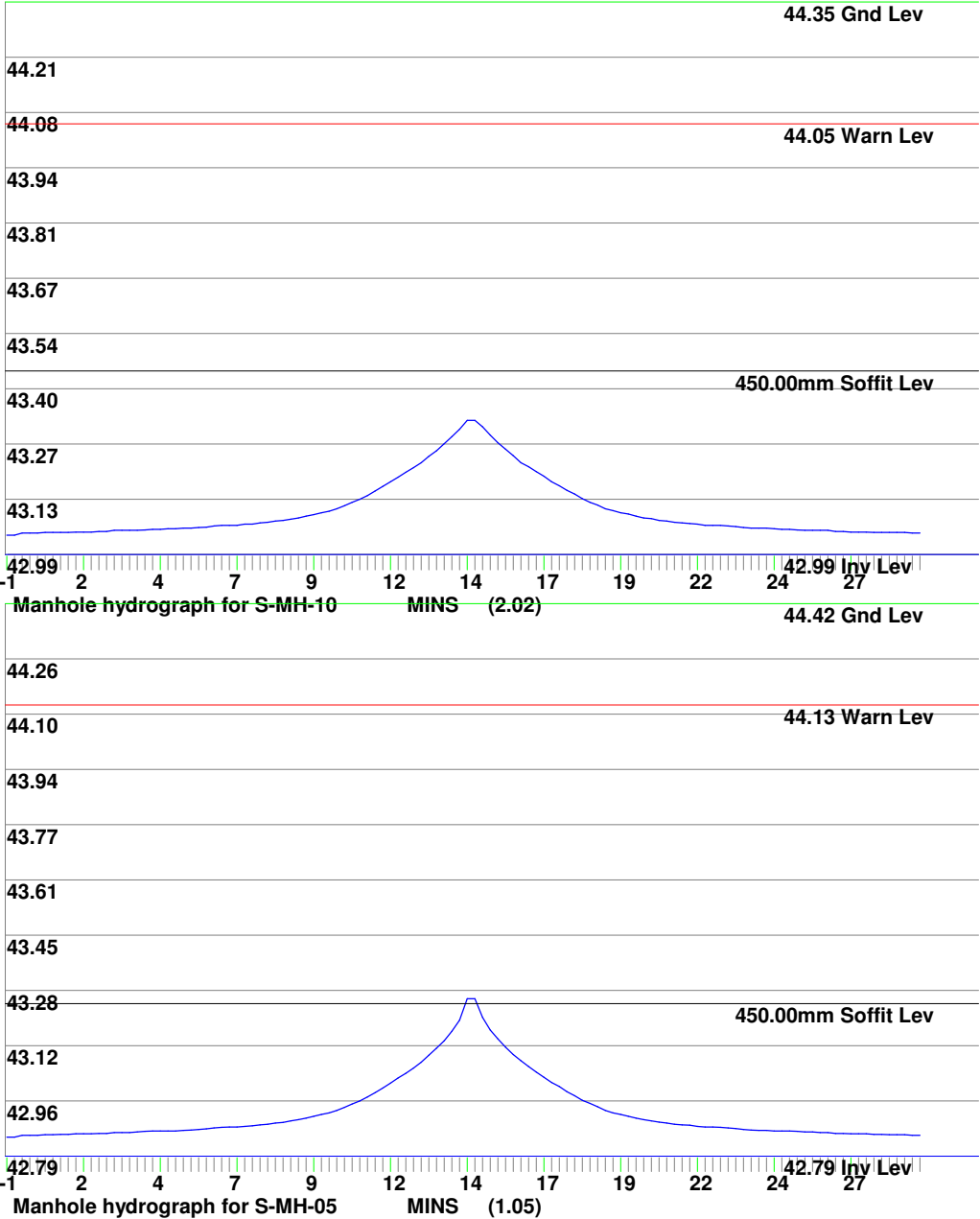
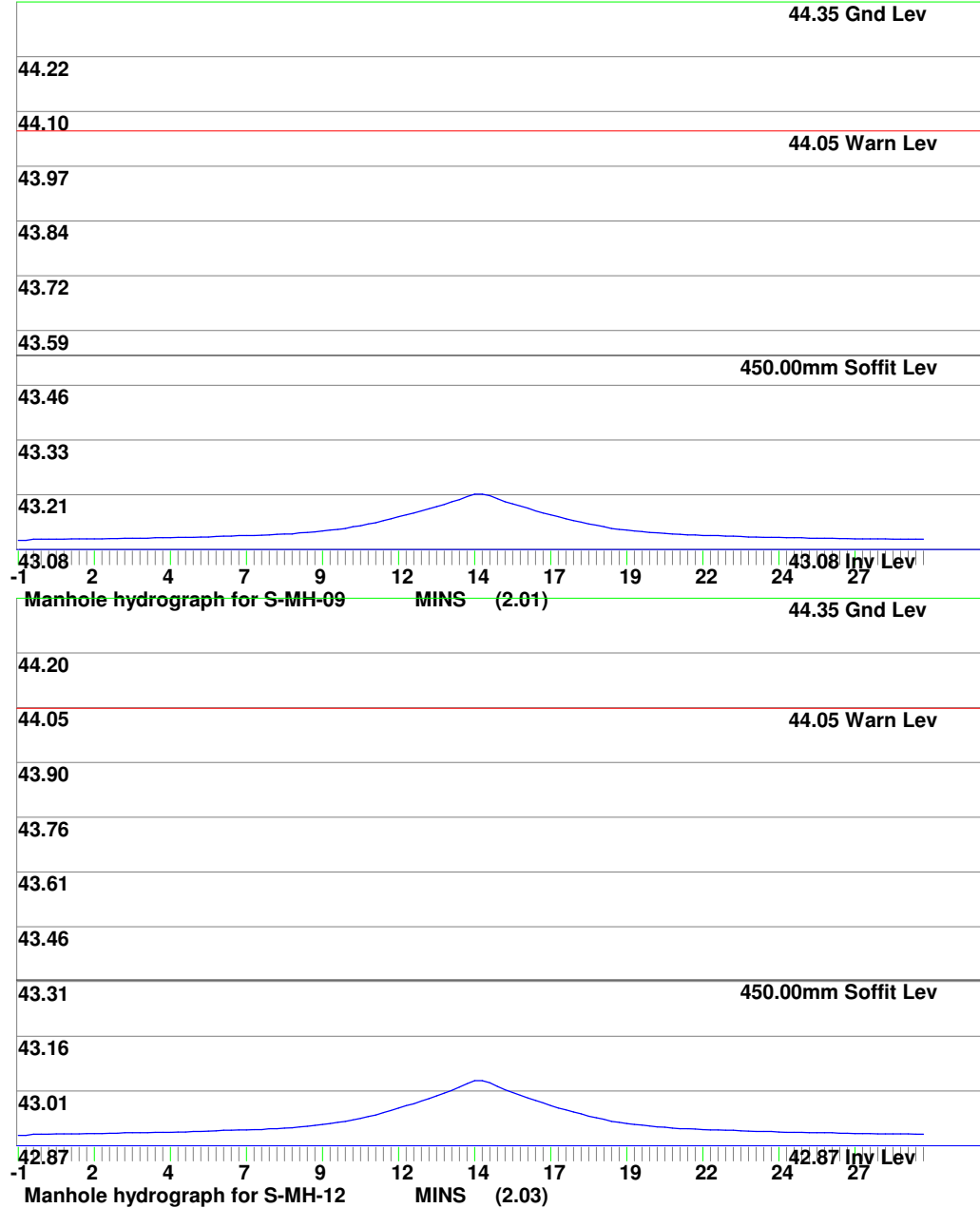
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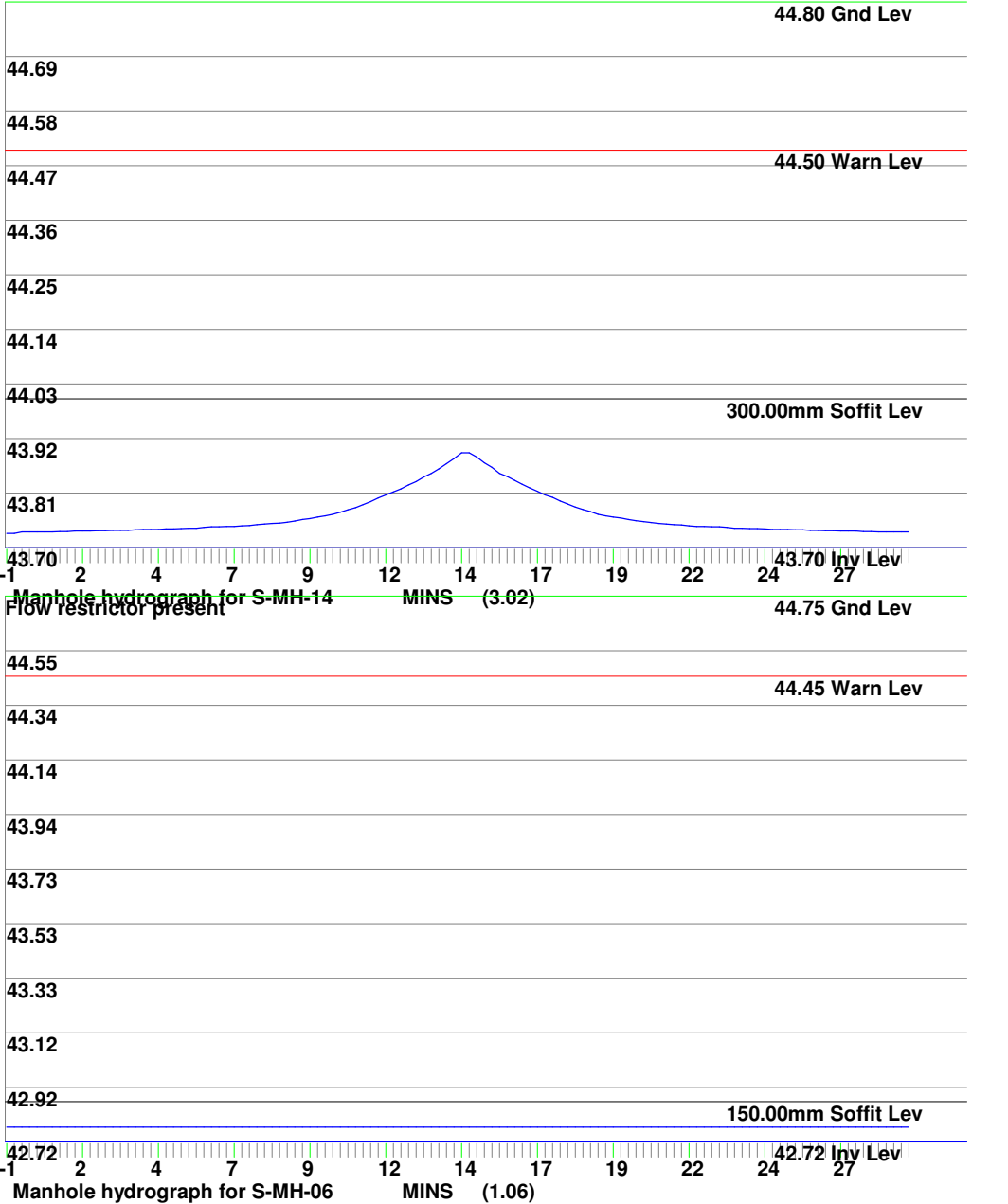
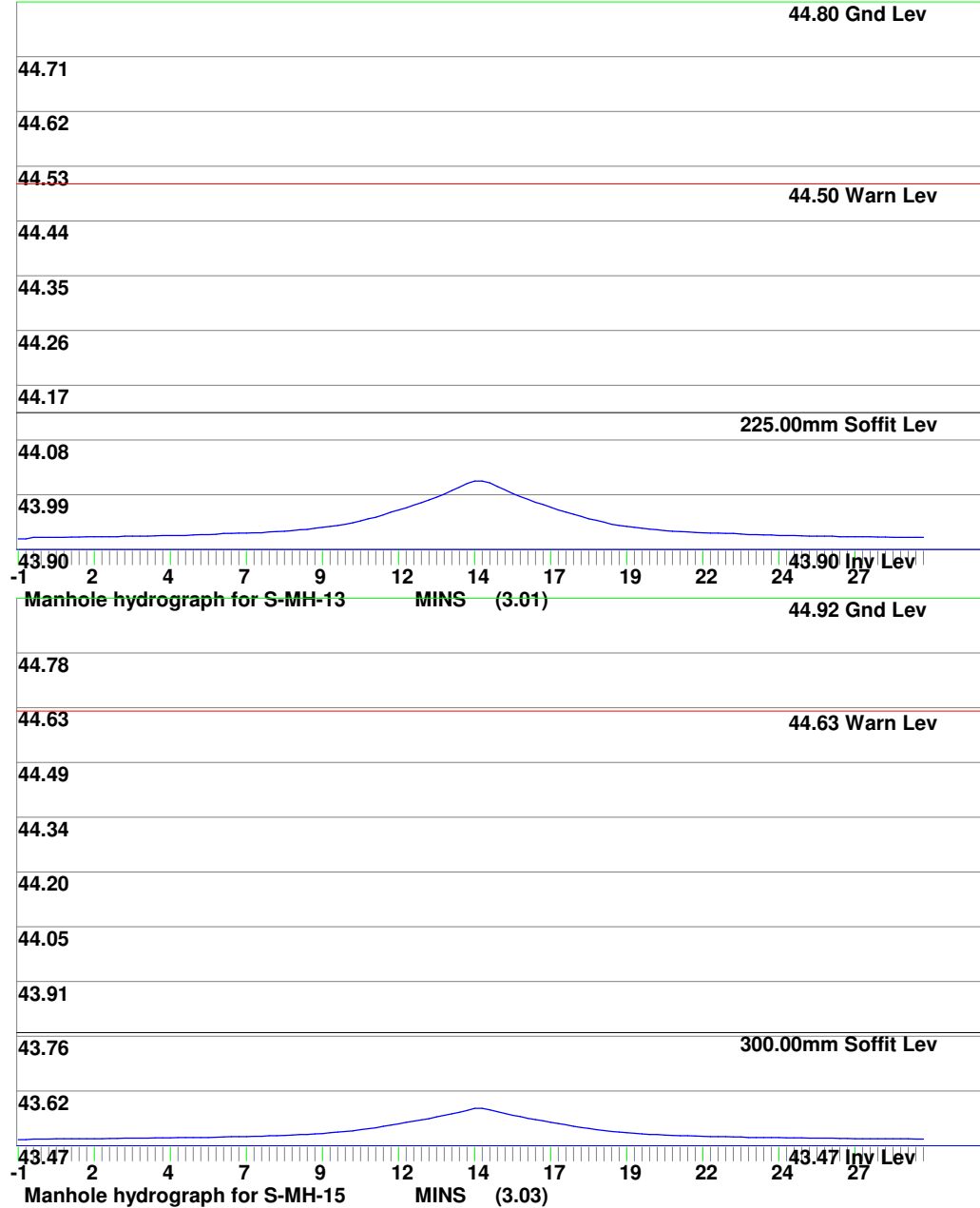
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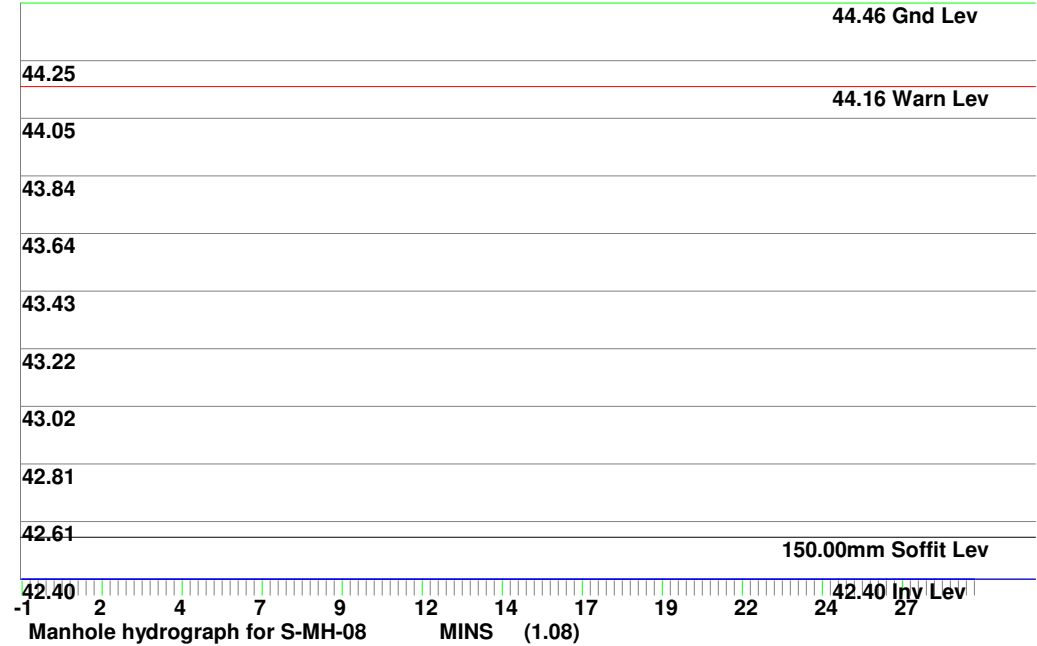
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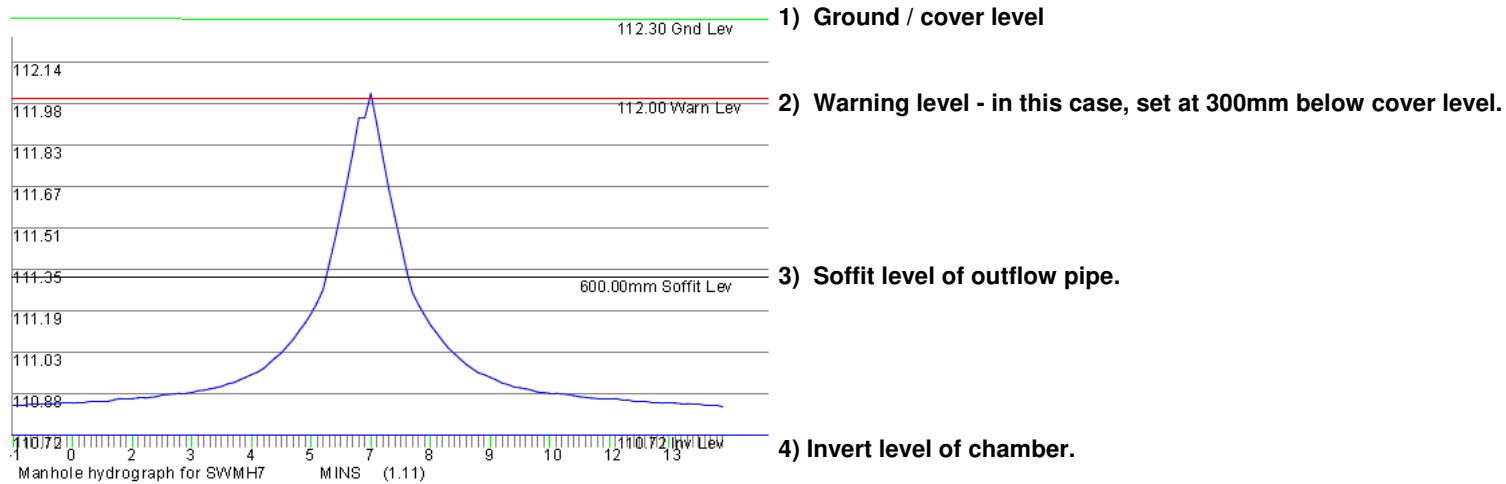
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- Notes**
- a) Lower section of the graph shows the water depth filling the channel. Channel is assumed to be a full pipe diameter in depth.
 - b) Upper section of the graph shows the water depth filling the chamber. Chamber has a greater width/diameter than the channel, so increases in depth are proportionally less.
 - c) The top of the graph clips the warning level and would be marked thus on the printout.
 - d) In many cases the invert of the offline storage is required to enter at the channel soffit level, meaning that the pipe will still surcharge but flooding risk reduced.
 - e) The diagram above is a general one and is not part of the current calculation.